Proceedings of the United States National Museum

SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Volume 123 1967 Number 3601

# Neotropical Species of Genus Triplax Herbst And Review of Genus Haematochiton Gorham (Coleoptera: Erotylidae)

*By* David H. Johnson

DETROIT PUBLIC LIBRARY

1967

TECHNOLOGY & SCIENCE

SMITHSONIAN PRESS

Proceedings of
the United States
National Museum

SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Volume 123 1967 Number 3601

# Neotropical Species of Genus Triplax Herbst And Review of Genus Haematochiton Gorham (Coleoptera: Erotylidae)[1]

*By* David H. Johnson[2]

## Neotropical Species of Genus *Triplax* Herbst

Although largely Holarctic in distribution, the genus *Triplax* Herbst ranges into tropical regions to some extent, especially the New World tropics. Some species having been erroneously referred to the genus and most species being inadequately described and poorly known, this paper is an attempt to clarify the confusion surrounding the Neotropical forms.

The first Neotropical species, *Triplax cruentipennis*, was described by Lacordaire in his monograph of 1842. In 1864 Philippi described *T. valdiviana*. Gorham's work in the "Biologia Centrali-Americana" in 1888 added four new species, *T. championi*, *T. hōgei*, *T. mesomelas*, and *T. rediviva*. Guérin (1952) described *T. bicolor* and *T. azureipennis*. In 1957, Delkeskamp described *T. maderi* from Brazil, and Boyle (1954, 1956, 1962) has described four species from Arizona whose ranges are either known or thought to extend into Mexico.

[1] Modified from a master's thesis submitted to Pennsylvania State University, 1966.

[2] Department of Entomology, Oklahoma State University, Stillwater.

In this study *T. cruentipennis* Lacordaire and *T. maderi* Delkeskamp have been removed from *Triplax* as now described and have been referred to *Haematochiton* Gorham. *Triplax valdiviana* Philippi has been declared incertae sedis because of the inconspicuous small pronotal angle pores, the lack of a brush on the maxillary palpal terminal segments, and the extremely elongate appearance (length to width ratio: 2.5 to 1). *Triplax azureipennis* has been declared incertae sedis, while *T. bicolor* is declared *Triplax*(?) *bicolor* Guérin. The present author has been unable to locate the types of these two forms.

The exact relation of the following genera, listed as Neotropical Triplacinae by Blackwelder (1945), to the Neotropical species of *Triplax* is not known: *Pselaphacus* Percheron; *Megischyrus* Crotch, *Ischyrus* Lacordaire, *Oocyanus* Hope, *Callischyrus* Crotch, *Mycomystes* Gorham, *Mycophthorus* Lacordaire, *Pseudolybas* Gorham, *Lybas* Lacordaire, *Lybanodes* Gorham, *Mycolybas* Crotch, and *Neoxestus* Crotch. It is felt, however, that the closest related genera to the Neotropical species of *Triplax* are *Paratritoma* Gorham, *Tritoma* Fabricius, *Haematochiton* Gorham, and *Mycotretus* Lacordaire. Species of *Haematochiton* Gorham are recognized easily by their weakly widened, semicircular maxillary palpal terminal segments, by their inconspicuous, small pronotal angle pores, and by a body shape similar to *Triplax*.

Neotropical *Triplax* species are separated easily from *Paratritoma* by the pronotal angle pores. In *Paratritoma* the pores are small and inconspicuous, while in *Triplax* they are large and distinctly umbilicate. In other characters, such as the length to width ratio of the body, shape of the pronotum, development of the postmandibular lobes, and width of the terminal segments of the maxillary palpi with distinct apical brush, few significant differences have been found. Thus, at present, *Paratritoma* is considered the most closely related of the Neotropical genera to *Triplax*.

The one Neotropical *Tritoma* specimen examined, that of *T. dorsalis* Gorham, can scarcely be confused with *Triplax*. Its broadly oval body, long prosternal lines, and maxillary palpal terminal segments without apical brush are all non-*Triplax* characters.

The taxonomic results of this study are that three specific names have been placed in new synonymy and three new species are described. Four species previously placed in *Triplax* are referred to *Haematochiton* Gorham or are declared incertae sedis. One species is, at present, of uncertain taxonomic position, while another species is moved from *Paratritoma* Gorham to *Triplax*. Twelve species are listed as Neotropical members of the genus *Triplax*.

METHODS AND TERMINOLOGY.—Male genitalia were prepared by relaxing the beetle for about an hour in warm water to which detergent had been added. After this relaxing, the abdomen was separated from the thorax and elytra, and the unsclerotized mass of tissue was removed from the sternites. The abdominal sternum was then placed, along with the rest of the beetle, on a new point and pin. The genitalia and associated soft organs were then soaked overnight in 10 percent KOH in "Plant Industry" syracuse dishes. After no more than 24 hours the genitalia were separated from associated residue, rinsed, and manipulated so that the internal sac was forcibly everted to show pigmentation and sclerotization of its inner surface. The anterior end of the internal sac was examined after being stained with merthiolate.

"Neotropical" as used in this work refers to all of the New World south of the United States, i.e., all of Mexico, Central America, the Antilles, and South America.

The terminology of external morphology is essentially that of Torre-Bueno (1962), while male genitalia terminology is essentially that of Sharp and Muir (1912).

The use of two words to indicate color refers to a blending of color hues. Thus, yellowish brown implies more brown than yellow. In all other cases involving color, the terminology is that of Torre-Bueno (1962).

ACKNOWLEDGMENTS.—The author was fortunate in having had the opportunity to examine 249 Triplacinae specimens from 13 museums and personal collections. To the following museums and personal collectors the author would like to extend his thanks for the loan of these specimens: American Museum of Natural History (AMNH); British Museum (Natural History), London (BM); California Academy of Sciences (CAS); Chicago Natural History Museum (CNHM); Department of Agriculture (Canada), Entomology Research Institute (DA); D. R. Whitehead personal collection, University of Alberta, Alberta, Canada (DRW); M. Alvarenga personal collection, Rio de Janiero, Brazil (MA); Museum of Comparative Zoology, Harvard (MCZ); Museum National d'Histoire Naturelle, Paris, France (MN); University of Arizona (UA); University of California, Berkeley (UCB); United States National Museum (USNM); W. W. Boyle, Pennsylvania State University (WWB).

The author owes special thanks to M. Alvarenga, Rio de Janiero, Brazil, for his loan of specimens; to W. W. Boyle, Pennsylvania State University, under whose guidance work on *Triplax* was undertaken; to A. Descarpentries of the Museum National d'Histoire Naturelle, Paris, for lending the type of *T. cruentipennis* Lacordaire; and to

H. S. Dybas, Chicago Natural History Museum, who lent a great number of Neotropical Triplacinae.

SYSTEMATIC TREATMENT.—Neotropical *Triplax* species display a wide range of coloration and moderate intraspecific variation in this coloration. Coloration includes black, ferrugineous, piceous, fulvus, yellowish brown, yellow, orange red, and red. Their general shape ranges from elongate-elliptical to relatively oval; the body length to width ratio ranges from about 1.6:1 to about 1.95:1. Specimens studied ranged in length from 2.34 to 5.12 mm and in width from 1.28 to 2.81 mm.

The head is elongate-oval, fitting tightly in the prothorax, and is visible from above. The eyes are finely faceted. The antennae are 11-segmented, generally more than one-half the width of the pronotal base; the club is relatively lax, its length 2 or more times its width. Antennal segmental coloration varies within some species. The terminal segments of the maxillary palpi are moderately to extremely widened, their width ranging from about 2.75 to 4 or 5 times their length; the maxillary palpus has a distinct brush present along the truncate apex. The terminal segments of the labial palpi are short-setigerous, each armed with a brush along its truncate apex. The mentum varies from small and obscurely pentagonal to larger and more distinctly pentagonal, with considerable intraspecific variation. The postmandibular lobes range in development from moderate to strong; in some species they are of diagnostic value, in others they are not.

The pronotum is margined laterally and basally, but it is immarginate medioapically between the eyes. Its shape ranges from subquadrate to subtrapezoidal. The pronotal angle pores are distinctly umbilicate, of moderate to large size.

The elytral striae are in some species strongly impressed, in others they are not. The elytra are basally margined or immarginate.

The prosternal lines are generally absent but when rarely present they are short, straight, not exceeding extreme anterior edges of coxae. The prosternum, with various degrees of punctuation among the species, is subtrapezoidal in shape. Prosternal, pronotal epipleural, mesosternal, metepisternal, and metepimeral sclerites, among others, are distinct. Metasternal coxal lines are generally absent but occasionally they are short, vestigial.

The abdomen is composed of five sternites, the first being the widest. This basal sternite has a narrow intercoxal process (not nearly so broad as in the closely related genus *Tritoma* Fabricius). The abdominal coxal lines are usually present.

The anterior and middle coxae are globular; those of the hindlegs are transverse. In comparison to the closely related genus *Tritoma*,

the coxae are narrowly separated and the tibiae are weakly widened apically. The hind trochanters are right triangular. The femora are somewhat swollen. The tarsi are 5-segmented with segment 4 strongly reduced; segment 3 has all four sides straight or nearly so.

One part of the male genitalia, the anterior end of the internal sac, has been shown by Boyle (1956) to demonstrate specific diagnostic relationships. The present study supports this.

Little is known concerning the life habits of this genus. In eastern North America favorite fungus hosts of *Triplax* species are species of *Pleurotus*, a soft bracket fungus; and in Arizona, *T. thompsoni* has been taken in large numbers on *Polyporus arcularius* on oak.

## Genus *Triplax* Herbst

*Triplax* Herbst, 1793, p. 146, pl. 49 (figs. 13, n). [Type-species: *Silpha russica* Linné, 1758, p. 360, by subsequent designation by Curtis, 1838 (1824–1840), vol. 15, p. 706.]

The following key to the Neotropical members of the genus *Triplax* includes three species—*T. thompsoni*, *T. marcescens*, and *T. californica*—the Mexican specimens of which are not definitely known. It is believed, however, that their ranges extend into Mexico, and for this reason they are included.

### Key to Neotropical Species of *Triplax*

1. Antennae black beyond segment 2, the stem clothed with moderately dense, coarse, black setae; antennal club narrow, segment 10 no more than twice as wide as segment 7; head above entirely reddish yellow; Arizona, Mexico? . . . . . **marcescens** Boyle
   Antennae not black or not entirely black, at least part of the antennae in addition to segments 1 and 2 lighter . . . . . 2
2. Elytra distinctly margined basally . . . . . 3
   Elytra immarginate basally, at most with a vestige of a margin laterally near the humeral callus . . . . . 10
3. Pronotum bearing a median apical and a smaller piceous spot near the middle of each side, the latter often weak, sometimes obsolete; anterior and lateral edges of postmandibular lobes sharply rounded, not posteriorly divergent; southwestern U.S., Mexico . . . . . **mesosternalis** Schaeffer
   Pronotum without spots . . . . . 4
4. Elytra yellow to red . . . . . 5
   Elytra never entirely yellow to red, some portion or all piceous to black . . 6
5. Pronotum piceous to black, not yellow to red; Texas, Mexico . **errans** Boyle
   Pronotum yellow to red; Central America . . . . **alvarengai**, new species
6. No part of pronotum black . . . . . 7
   Some part of pronotum black . . . . . 9
7. Abdomen usually testaceous; terminal segments of maxillary palpi moderately widened, their width less than 3 times length; eastern North America to Panama . . . . . **flavicollis** Lacordaire
   Abdomen not testaceous; terminal segments of maxillary palpi strongly widened, their width more than 3 times length . . . . . 8

8. Mesothorax and metathorax not entirely black; cephalic and pronotal punctures not exceptionally coarse; antennal club not abruptly 3-segmented; Arizona, Mexico . . . . . **wehrlei** Boyle
Mesothorax and metathorax entirely black; cephalic and pronotal punctures exceptionally coarse; antennal club abruptly 3-segmented; Arizona, Mexico? . . . . . **thompsoni** Boyle
9. Elytral striae strongly impressed; maxillary palpal terminal segments not exceptionally wide, width about 3.5 times length; lateral edges of postmandibular lobes straight (fig. 7); Mexico . . . . . **sola**, new species
Elytral striae not strongly impressed; maxillary palpal terminal segments exceptionally wide, width about 4.7 times length; lateral edges of postmandibular lobes not straight (fig. 4); Brazil . . **latipalpus**, new species
10. Elytra not particolored . . . . . 11
Elyta particolored . . . . . 12
11. Antennae entirely yellow or testaceous; pronotal angle pores of normal size; Guatemala . . . . . **rediviva** Gorham
Antennae not entirely yellow or testaceous; pronotal angle pores extremely large; western North America, Mexico? . . . . . **californica** LeConte
12. Pronotum particolored; 60 percent of elytral length behind base not entirely yellow; Costa Rica, Central America? . . . . . **divisa** (Gorham)

### *Triplax alvarengai*, new species

FIGURE 1

Diagnostic description: Color variable, ranging from fulvus, with or without elytral apical region darker, to nitidous red; underside testaceous to brownish; number of yellow antennal segments variable; body moderately nitidous. Body shape essentially elliptical, anterior and posterior ends about equally parabolically rounded, ratio of length to width 1.6 to 1; pronotum subtrapezoidal, basal width about three-fifths greater than apical width; elytra widest at about 35 percent of length behind elytral base. Antennal length about equal to distance to pronotal base, club 4-segmented, segment 10 about 3.5 times width of segment 7. Apex of epistomofrontal region of head faintly concave in very shallow arc or V, epistomal apex immarginate. Postmandibular lobes moderate in size, lateral edges somewhat rounded; terminal segments of maxillary palpi strongly widened, width about 3.5 times length; mentum rather small, size and shape somewhat variable. Pronotal punctures not deeply impressed, somewhat more closely spaced and deeply impressed laterally; cephalic punctures much more closely spaced and coarser; elytral striae moderately impressed.

Variation: Color is somewhat variable. Specimens examined from the Canal Zone displayed a brown to black area in the apical elytral 20 to 40 per cent. An examination of the anterior end of the internal sac (fig. 1), however, has shown all of these specimens to be con-

specific. The size range of the 22 specimens examined is: length 2.81–4.27 mm; width 1.69–2.39 mm.

Male genitalia: Illustrated in figure 1.

Holotype: Male, labeled "Ciruclas, Costa Rica, IX–22–30; collected by A. Alfaro" (property of CNHM). Its measurements are: length 3.71 mm; width 2.14 mm.

Type-locality: Ciruclas, Costa Rica.

Paratypes: MEXICO: Veracruz, Coyame (Whitehead; WWB), 4; Veracruz, Buen Pais (Bechtel and Schinger; CNHM), 1; Veracruz,

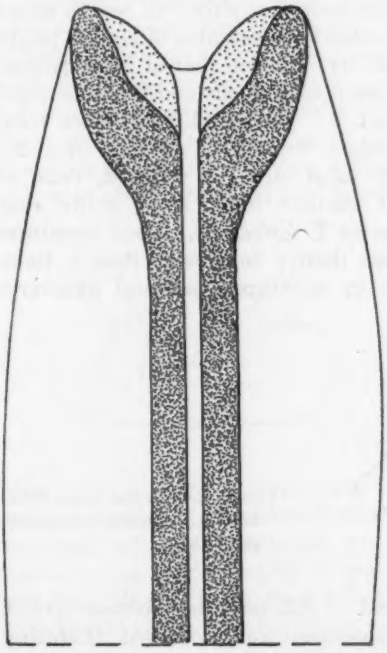

FIGURE 1.—*Triplax alvarengai*, new species: anterior end of internal sac, anterodorsal view.

Cerro Gordo (Seevers; CNHM), 1. COSTA RICA: Same data as type (CNHM), 1. PANAMA: Canal Zone, Barro Colorado (Darlington; AMNH), 1; Canal Zone, Barro Colorado Island (lot 47-4230; USNM), 1; Canal Zone, Fort Clayton (Frick; CAS), 1; Paraiso (Schwarz; USNM), 1. EL SALVADOR: La Libertad (Bechyne, MA), 5; La Libertad (Bechyne; WWB), 5.

Distribution: From Panama to Mexico.

### *Triplax divisa* (Gorham), new combination

FIGURE 2

*Paratritoma divisa* Gorham, 1888, p. 72, pl. 4 (fig. 11).

Diagnostic description: Head, medial portion of pronotum, anterior one-sixth of elytra, and posterior one-half of elytra piceous; remainder dark yellow above. Underside entirely piceous except for legs, maxillary and labial palpi, pronotal epipleura anteriorly, and posterior one-third of abdomen. Scape and pedicel yellowish; other segments, except for last three which are piceous, yellowish brown. Body moderately nitidous. Shape somewhat elliptical, length about 1.78 times width, body widest at about three-tenths of elytral length behind base, length to width ratio very close to that of *T. latipalpus*, about 1.75 to 1. Last antennal segment bulbous and large, segment 10 about 3 times width segment 8. Postmandibular lobes long, posteriorly slightly divergent, edges somewhat rounded (fig. 2). Terminal segments of maxillary palpi strongly widened, ratio of width to length about 3.6 to 1, distinct brush along entire apex present (fig. 2). Mentum similar to *T. latipalpus*. Head punctures relatively deep, separated by less than 1 to greater than 4 times their diameter, prominent setae in punctures; pronotal punctures fine.

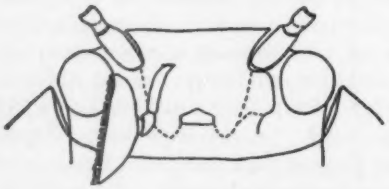

FIGURE 2.—*Triplax divisa* (Gorham), new combination: underside of head.

Discussion: The adult is figured in full color by Gorham (1888, pl. 4: fig. 11). In this study two specimens were examined. Labeling is as follows: "Costa Rica, F. Nevermann, 24–VI–'29, property of U.S.N.M." (USNM, a female). "Ciruclas, Costa Rica, collected by A. Alfaro, IX–22–'30" (CNHM, a female). Alvarenga (1965) has stated that *Paratritoma divisa* Gorham is the type-species of *Paratritoma* Gorham. This in effect synonymizes *Triplax* and *Paratritoma*. Gorham made three original watercolor drawings of the three "varieties" he considered to be *P. divisa*. The first two are red and black in color, the third yellowish and piceous. I have examined a series of *Paratritoma* species that I agree to be indeed *Paratritoma*. Figure 11, however, as illustrated by Gorham (1888), and the descrip-

tion thereof provide strong evidence that figure 11 is indeed that of a form that should be considered *Triplax*.

Male genitalia: Male not known.

Type: Not seen.

Distribution: Costa Rica.

### *Triplax errans* Boyle

FIGURE 3

*Triplax errans* Boyle, 1956, p. 110.

Diagnostic description: Head above and gular region below black, prothorax and antennal clubs black; elytra and scutellum orange red to brilliant strongly nitidous red (except in tenerals); antennae grading from brownish yellow to black; genae, mouthparts, pterothorax, abdomen, and legs brownish yellow; body strongly nitidous. Overall shape short and broad, sides of body subparallel from middle of pronotum to middle of elytra, lengh to width ratio 1.8 to 1; body widest at about one-third the elytral length behind base; pronotum

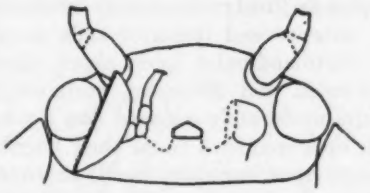

FIGURE 3.—*Triplax errans* Boyle: underside of head.

widest just in front of base, sides evenly arcuate and strongly convergent apically. Postmandibular lobes, terminal segments of maxillary palpi, and mentum are shown in figure 3. Antennae two-thirds as long as width of pronotal base, the club 5-segmented and gradually widening over segments 7 to 9. Pronotal punctures of moderate size, somewhat larger and denser laterally, each bearing a minute seta that feebly exceeds the puncture; cephalic punctures denser apically, each bearing a protruding seta; elytral intervals minutely punctuate.

Variation: The 35 specimens examined ranged in length from 2.85 to 4.34 mm and in width from 1.57 to 2.51 mm. Boyle (1956) states that the measurements of the type are: length 4.14 mm; width 2.30 mm.

Male genitalia: Boyle (1956, p. 166, fig. 99) illustrates the anterior end of the internal sac.

Type: Male; labeled "Brownsville, Texas, VI–30–38; holotype, *Triplax errans* Boyle" (R. I. Sailer; collection University of Kansas).

Type-locality: Brownsville, Cameron Co., Tex.

Distribution: Other than the holotype from Brownsville, Tex., this species is known at present only from San Luis Potosí, Mexico. The material examined included 35 specimens from the following localities in San Luis Potosí: Tamazunchale, Huichihuayan, and Pajal.

### *Triplax flavicollis* Lacordaire

*Triplax flavicollis* Lacordaire, 1842, p. 218.
*Triplax confinis* LeConte, 1854, p. 162.
*Triplax championi* Gorham, 1888, p. 78. [New synonymy.]
*Triplax hōgei* Gorham, 1888, p. 78. [New synonymy.]
*Triplax mesomelas* Gorham, 1888, p. 79. [New synonymy.]

Diagnostic description: Color variable; elytra ranging from ferrugineous to black; the following yellow to testaceous: head, pronotum, prothorax, and mesothorax; metathoracic coloration variable, sometimes metepisterna and metepimera are black, sometimes entire metathorax is black; abdomen testaceous to piceous; antennal coloration variable, club ranging from reddish yellow to piceous, stem grading from reddish yellow to piceous; body moderately nitidous. Body shape somewhat elliptical, anterior and posterior ends about equally parabolically rounded. Postmandibular lobes short, their lateral edges often somewhat rounded and divergent posteriorly; terminal segments of maxillary palpi moderately widened (see Boyle, 1956, p. 164, fig. 76), their width approaching 3 times their length, a distinct brush present along entire apex; mentum small; antennal club gradually 4-segmented. Pronotal punctures of moderate size, not deep; cephalic punctures much larger and denser; elytral striae impressed, small punctures present in elytral intervals; elytra distinctly margined basally.

Variation: The observed size variation of the 108 Neotropical specimens examined is: length 2.60–5.12 mm; width 1.44–2.81 mm.

Discussion: The three "species" that Gorham listed as distinct have not been found to be so. A "separation" of the specimens by comparison of the postmandibular lobes (and coloration of the metathorax according to Gorham's descriptions) of *T. championi*, *T. hōgei*, and *T. mesomelas* showed intergradation and cast doubt on the tenability of these three "species." A comparison of the anterior end of the internal sac of the "three forms" showed that they were conspecific.

Male genitalia: See Boyle (1956, p. 166, fig. 93).

Type: Not seen.

Type-locality: North America.

Distribution: North America east of the 100th meridian from Quebec to Florida and Texas, south into Mexico and Central America

to Panama. The material examined included 108 specimens from the following localities: MEXICO: Jalisco, Acatlán; Morelos, Ixtapan de la Sal; Cerro de Plumas; Guerrero, Acahuizlotla; Nayarit, San Blas. GUATEMALA: Sacatepequez, Finca San Rafael, 7200 ft. EL SALVADOR: La Libertad; Fingalapaz. PANAMA: Canal Zone: Barro Colorado, and Paraiso; Bugaba.

### *Triplax latipalpus*, new species

FIGURE 4

Diagnostic description: Head reddish brown; pronotum ferrugineous laterally, piceous medially; elytra and scutellum black; the following yellowish brown: underside of head, mouthparts, legs, prothorax, mesothorax, and posterior half of abdomen; anterior half of abdomen and elytral epipleura piceous; antennae yellowish brown except for piceous terminal four segments. Body strongly nitidous. Shape somewhat elliptical, length about 1.75 times width; body widest at about one-third elytral length behind base. Antennal segment 10 about 2.4 times width of segment 8. Postmandibular lobes distinctive, large in size, lateral edges somewhat rounded (fig. 4). Terminal

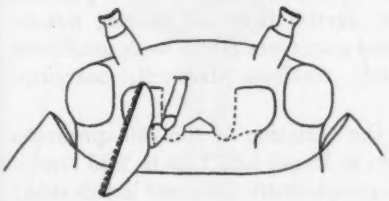

FIGURE 4.—*Triplax latipalpus*, new species: underside of head.

segment of maxillary palpus extremely widened with distinct brush, width about 4.7 times length (fig. 4). Head punctures with prominent setae; elytral interval punctures prominent, elytral striae not strongly impressed. Antennal setae sparse.

Male genitalia: Male not known.

Holotype: Female. Labeled "Brasilien, Nova Teutonia, 27°11′8″, 52°23′1″, 5-VI-1957 F. Plaumann" (WWB; placed in USNM). Its measurements are: length 4.04 mm; width 2.17 mm.

Type-locality: Nova Teutonia, Brazil.

Paratype: Female; labeled "Brasilien, Nova Teutonia, 27°11′8″, 52°23′1″, X-1957 F. Plaumann" (WWB; in personal collection of W. Wayne Boyle, Pennsylvania State University).

Distribution: The two specimens examined were collected in Brazil.

### *Triplax mesosternalis* Schaeffer

*Triplax mesosternalis* Schaeffer, 1905, p. 145.
*Triplax monostigma* Casey, 1916, p. 165.
*Triplax coloradana* Casey, 1924, p. 179.

Diagnostic description: Piceous black color, the prothorax (except three black pronotal spots, one medio-apical and a smaller one on each side), head, mesosternum, mesepisterna, and appendages reddish yellow; mesepimera and hind coxae piceous; lateral piceous spots of pronotum only slightly smaller than median apical spot, placed far laterally, slightly anteriad of middle, and about equidistant from apex and side of pronotum, median apical spot always present, lateral spots often weak, rarely not detectable; antenna beyond segments 1 and 2 darker than head; body moderately nitidous. Antennae relatively long, length equal to about nine-tenths of width of pronotal base, club 3-segmented. Postmandibular lobes short, lateral edges somewhat rounded and subparallel; terminal segments of maxillary palpi moderately widened, width slightly more than twice length (Boyle, 1956, fig. 78, p. 165). Pronotal punctures coarse, becoming larger and denser laterally where they are mostly separated by about the distance of their diameters or slightly less; cephalic punctures small and dense medially and apically, sparser and approximately as large as pronotal punctures laterobasally near eyes; elytral intervals bearing minute punctules more numerous than strial punctures and a weak meshwork of fine fissures; elytra moderately nitidous, distinctly margined basally.

Variation: Boyle (1956) states the variation of the 230 specimens he examined to be 3.31 to 5.11 mm in length and 1.52 to 2.35 mm in width. The measurements of the one specimen examined in this study are: length 3.77 mm; width 2.03 mm.

Male genitalia: The anterior end of the internal sac is illustrated by Boyle (1956, p. 166, fig. 94).

Type: Boyle (1956) chose a lectotype from a series of 5 cotypes at the USNM and labelled it "Lectotype, Boyle, 1952." The material examined in this study included one specimen from Chiapas, Mexico.

### *Triplax rediviva* Gorham

FIGURES 5, 6

*Triplax rediviva* Gorham, 1888, p. 79, pl. 4 (fig. 19).

Diagnostic description: Elytra ferrugineous to piceous; scutellum testaceous to ferrugineous; head and pronotum testaceous; metathorax and abdomen ferrugineous; rest of underside, including legs, testaceous; antennae wholly testaceous; metacoxae usually ferrugineous. Body moderately nitidous. Body shape elongate-elliptical, anterior

and posterior ends about equally parabolically rounded, ratio of length to width about 1.95 to 1. Antennal club 4-segmented, setal vestiture moderate, width of segment 10 about 2.6 times that of segment 7. Apex of the epistomofrontal region of the head essentially straight. Lateral edges of postmandibular lobes posteriorly divergent (fig. 5), overall shape close to that of *T. californica;* terminal segments of

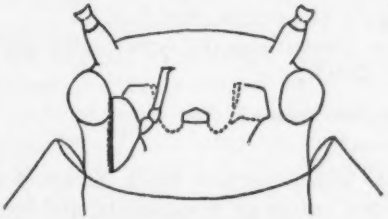

FIGURE 5.—*Triplax rediviva* Gorham: underside of head.

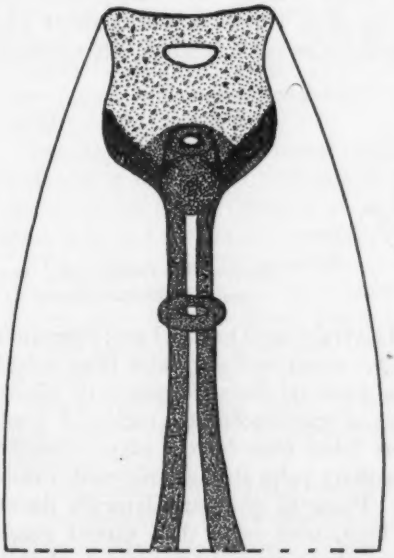

FIGURE 6.—*Triplax rediviva* Gorham: anterior end of internal sac, anterodorsal view.

maxillary palpi moderately widened, their width about 2.75 times their length (fig. 5); mentum small. Pronotal punctures coarse and deep; head punctures somewhat coarse, not evenly arranged; elytral striae impressed, elytral interval punctures present; prosternum covered with exceptionally large and deep punctures; pronotum covered with finer punctures; metasternum with large punctures laterally but not so sharply incised as on the prosternum, a single long seta projecting from each metasternal puncture.

Variation: The range in size of all specimens examined is: length 3.20–4.22 mm; width 1.57–2.14 mm.

Male genitalia: The anterior end of the internal sac is illustrated in figure 6.

Type: Not seen; collected by Champion; Gorham (1888, pl. 4: fig. 19) shows the type in color, but the name is misspelled "*redivivus*" on the plate.

Type-locality: Guatemala, Quiche Mountains, 8000 feet.

Distribution: Known only from Guatemala: the type-locality and Sacatepequez, Finca San Rafael, 7200 ft.

***Triplax sola*, new species**

FIGURE 7

Diagnostic description: Entire dorsal surface black except for tawny basal three-fourths of elytra; antennae, mouthparts, and legs piceous, rest of the underside black. Body moderately nitidous. Body shape elongate-elliptical, ratio of length to width about 1.95 to 1; anterior and posterior ends about equally parabolically rounded,

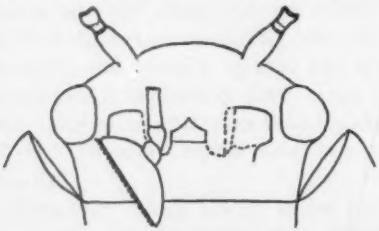

FIGURE 7.—*Triplax sola*, new species: underside of head.

widest point at about one-fifth of elytral length behind base; pronotum subtrapezoidal, basal width about seven-tenths greater than apical width. Antennae extending to pronotal base, segment 10 about twice width of segment 8. Apex of epistomofrontal region of head feebly concave. Postmandibular lobes with lateral edges straight (fig. 7); terminal segments of maxillary palpi strongly widened, width about 3.5 times length (fig. 7). Pronotal punctures laterally dense and large, medially somewhat finer, with setae that exceed rims; cephalic punctures dense; elytral striae strongly impressed, elytral intervals punctulate; elytra distinctly margined basally.

Discussion: The specific epithet *sola* refers to the single specimen examined in this work.

Male genitalia: Male not known.

Holotype: Female. Labeled "San Juan del Rio, 10 Mi. E., Quere Taro, Mexico, 30–VII–1954, J. G. Chillcott collector" (DA). Its measurements are: length 4.08 mm; width 2.12 mm.

Type-locality: San Juan del Rio, Quere Taro, Mexico.

### *Triplax wehrlei* Boyle

*Triplax wehrlei* Boyle, 1954a, p. 260.

Diagnostic description: Ferrugineous to reddish yellow in color, antennal clubs and elytra black, elytral epipleura reddish yellow, scutellum piceous; body weakly nitidous, feebly pubescent on head and pronotum above and on entire thorax below, abdomen with stronger pubescence. Postmandibular lobes short, lateral edges strongly rounded, subparallel (see Boyle, 1956, fig. 84, p. 165), terminal segments of maxillary palpi strongly widened, width more than 3 times length. Antennal length equal to about two-thirds width of pronotal base, club 4-segmented (or 5-segmented if one includes segment 7), gradually emergent. Epistomofrontal region of head with sides straight to feebly convex, apical angles of epistoma moderately rounded, apex more strongly concave in a shallow V than *T. flavicollis*. Pronotal punctures moderate size and density, separated by about the distance of their diameters; cephalic punctures similar in size but denser, each with a seta; elytral intervals with moderately large punctures (more than twice as numerous as strial punctures), and strong meshwork of fine fissures; elytra margined basally.

Variation: The 39 specimens examined ranged in size from 2.34 to 3.69 mm in length and 1.28 to 2.00 mm in width. The 3 specimens examined by Boyle (1956) from southern Arizona ranged in length from 4.14 to 4.55 mm and in width from 2.12 to 2.30 mm.

Discussion: The 39 specimens examined is the largest series, at present, known to have been studied. Heretofore, this form was known only from southern Arizona.

Male genitalia: The anterior end of the internal sac is illustrated in Boyle (1956, fig. 96, p. 166).

Type: Boyle (1956) states the following: "Male; labeled 'Patagonia, Ariz., VII–9–30; holotype, *Triplax wehrlei* Boyle' (J. O. Martin; collection C.A.S.)."

Type-locality: Patagonia, Santa Cruz Co., Ariz.

Distribution: The 39 specimens examined in this study were all taken at Morelos, Mexico. Thus, the present known range of this form is Arizona to Morelos, Mexico.

## Review of Genus *Haematochiton* Gorham

The taxonomic history of this group began with Gorham's establishment of *Haematochiton* as a new genus in the Triplacinae in 1888 (1887–1899). He established *H. elateroides* Gorham, 1888, as the type-species. Blackwelder's Neotropical catalog lists one species as *Haematochiton: H. elateroides* Gorham, 1888. Boyle (1956) syn-

onymized the genus *Scaeother* Gorham, 1888, with *Haematochiton* Gorham, 1888. Boyle (1956) synonymized *H. bisculptum* Casey, 1916, with *H. elateroides* Gorham, 1888, and synonymized the following two forms under *H. carbonarius* (Gorham, 1888), new combination: *Scaoether carbonarius* Gorham, 1888 (1887–1899), and *Scaoether opacus* Schaeffer, 1915. Boyle (1956) created a key for the two species then recognized: *H. elateroides* Gorham, 1888, and *H. carbonarius* (Gorham). Alvarenga in 1965 stated that the type-species is *Haematochiton elateroides* Gorham, 1888.

In the present study four species are recognized in the Neotropical region and in the southwestern United States. *H. elateroides* Gorham and *H. carbonarius* (Gorham) are kept in *Haematochiton* while two forms heretofore described as *Triplax* are transferred to *Haematochiton*.

Distribution: The genus *Haematochiton* Gorham occurs only in the Western Hemisphere. Specimens have been taken in the southwestern United States, Mexico, and Brazil.

METHODS AND TERMINOLOGY.—Methods are the same as those used for *Triplax* (see p. 3).

"Neotropical" and other terminology are also the same as those used in *Triplax* (see p. 3).

ACKNOWLEDGMENTS.—For the genus *Haematochiton*, the author is indebted to the same collectors and institutions for the loan of material and Triplacinae specimens as for *Triplax* (see p. 3).

The author owes special thanks to Dr. W. Wayne Boyle, Pennsylvania State University, under whose guidance work on *Haematochiton* was undertaken.

SYSTEMATIC TREATMENT.—*Haematochiton* species display several colors, including dull carbonaceous black, nitidous black with blood red, and black with yellow. The general shape can best be described as elongate-elliptical with anterior and posterior ends of the body almost equally parabolically rounded, the anterior end somewhat more obtusely rounded, however. The ratios of the length to the width vary from 1.9 to 2.2:1. In lateral view the dorsal profile is somewhat flattened medially.

The head is visible from directly above. The eyes are finely faceted, small, but vaguely coarser than in *Triplax*. The ocular striae terminates at or behind the antennal insertions and the epistoma is consequently immarginate. The antennae is about equal to three-fifths to three-fourths of the pronotal basal width in length; its club is 4- to 5-segmented and is gradually emergent from the stem; segment 3 is subequal in length to segments 4 and 5 together. The maxillary palpi are semicircular and are less than twice as wide as long and are not armed with a distinct apical brush; the maxillary palpi are much

larger than the securiform terminal segments of the labial palpi; the labial palpi terminal segments are securiform, each bearing a single stronger seta laterally, and armed with a minute brush along the truncate apex. The lacinia is armed with two small incurved teeth at apex; and the postmandibular lobes are somewhat reduced to moderate in size.

The pronotum is subquadrate to subtrapezoidal in shape, while the sides are moderately arcuately convergent anteriorly; the apical width is subequal or equal to the median length. The pronotum is finely margined basally and laterally, immarginate apically between the eyes, and the pronotal angle pores are small and inconspicuous, not large and umbilicate. The elytra is distinctly basally margined.

The legs are distinctly tridentate at apex; the tibiae are not or very slightly dilated apically and are feebly arched; the coxae are moderately separated.

Abdominal pubescence is extremely faint to moderate. Pubescence is, however, not indicated as being of strong taxonomic importance.

The anterior end of the internal sac is distinctive.

The strongest differences between *Haematochiton* and *Mycotretus* are those of color and punctuation, the somewhat more obtusely rounded anterior end of the body in the former, and the absence in the former of the pronotal margin at apex between the eyes.

The most obvious differences between species of *Triplax* and those of *Haematochiton* are shown by the following characters of the latter: maxillary palpi terminal segments semicircular, not moderate to strongly widened with terminal brush; prontal angle pores small and inconspicuous, not large and distinctly umbilicate.

Species of *Tritoma* Fabricius and *Paratritoma* Gorham hardly can be confused with *Haematochiton* Gorham. *Paratritoma* has moderate to strongly widened maxillary palpi terminal segments with distinct brush; *Haematochiton* does not. *Tritoma* is characterized by an oval to elongate-oval form in the Nearctics; *Tritoma dorsalis* Gorham from Panama is broadly oval; *Haematochiton* species on the other hand are elongate-elliptical.

Nothing is known of the life habits of *Haematochiton* species. The genus does not contain species of economic importance.

### Genus *Haematochiton* Gorham

*Haematochiton* Gorham, 1888, p. 81. [Type-species: *H. elateroides* Gorham, 1888, p. 81, pl. 5 (fig. 4), by monotypy.]
*Scaeother* Gorham, 1888, p. 82.

### Key to Species of *Haematochiton* Gorham

1. Elyta orange red or blood red . . . . . 2
   Elytra dull black or black . . . . . 3

2. Prosternal lines connecting apicomedially on prosternum; metasternal coxal lines long; Brazil . . . . . **cruentipennis** (Lacordaire)
Prosternal lines not connecting apicomedially on prosternum; metasternal coxal lines short or absent; southwestern United States, Mexico.
**elateroides** Gorham

3. Pronotum yellow with black spots; Brazil . . . . . **maderi** (Delkeskamp)
Pronotum dull black, without spots; southwestern United States, Mexico.
**carbonarius** (Gorham)

### *Haematochiton cruentipennis* (Lacordaire), new combination

FIGURE 8

*Triplax cruentipennis* Lacordaire, 1842, p. 205.

Diagnostic description; Head, pronotum, and scutellum black; elytra red with orange tinge, faint parallel lines of darker pigmentation on intervals; underside entirely black including legs and mouthparts. Overall shape elongate-elliptical, length to width ratio about 1.9 to 1. Antennae entirely reddish yellow except for blackish terminal 4 or 5 segments; antennal club strongly widened, ratio of width of segment 10 to that of 6 is 3.3 to 1; antennae extending to the base of the prothorax, setae of club dense. Maxillary palpi ratio width to length about 1.5 to 1 (fig. 8). Postmandibular lobes relatively small, strongly rounded posteriorly and anteriorly (fig. 8). Pronotum subtrapezoidal in shape, widest basally, sides moderately arcuately convergent anteriorly; the four pronotal angles are in equal focus

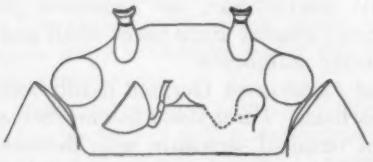

FIGURE 8.—*Haematochiton cruentipennis* (Lacordaire), new combination: underside of head.

when viewed from above. Pronotal angle pores small and inconspicuous. Pronotal punctures relatively small and shallow medially, suddenly becoming much larger on lateral thirds. Elytral intervals punctured. Prosternal coxal lines unusually large and prominent extending to prosternal apical region and connecting medioapically. Cephalic punctures relatively large and flat bottomed along base, becoming smaller and denser apically. Abdominal pubescence and punctuation moderate.

Variation: The observed size of the one specimen examined, the holotype, from the Museum National d'Histoire Naturelle, Paris, is: length 5.63 mm; width 2.98 mm.

Male genitalia: The unique type was not dissected.

Biology: Nothing is known of the biology of this form.

Type: Sex unknown, in Museum National d'Histoire Naturelle, Paris, labeled "*cruentipennis* Lacordaire, Type, 'Brasil'."

Type-locality: "Brasil."

Distribution: The only specimen known to the author is that of the unique type labeled "Brasil."

***Haematochiton elateroides* Gorham**

*Haematochiton elateroides* Gorham, 1888, p. 81, pl. 5 (fig. 4.)
*Haematochiton bisculptum* Casey, 1916, p. 168.

Diagnostic description: Coloration of head and pronotum black, elytra blood red except at extreme apices. Overall shape is elongate-elliptical; two ends of the body are about equally parabolically rounded, length to width ratio about 2.2 to 1. Maxillary palpi terminal segments moderately widened without distinct brush. Pronotum subtrapezoidal, moderately convergent anteriorly, median length about one-eighth shorter than the apical width, the four pronotal angles are in view when viewed from directly above. Pronotal punctures relatively small and shallow medially, suddenly much larger and distinctly flat bottomed on lateral thirds. Elytra blood red except at apices, relatively nitidous. Cephalic punctures relatively large and flat bottomed along base, becoming smaller and denser apically. Abdominal pubescence and punctuation weak. Abdominal and metasternal coxal lines absent; if occasionally present, they are short basal traces. Specimens of *H. elateroides* Gorham from the Chiricahua Mountains were compared with the unique type of *H. cruentipennis* (Lacordaire). The most obvious differences between the two species are shown by the following characteristics of the former: elytral intervals impunctulate, not punctured; metasternal coxal lines short to absent, not long and prominent; prosternal coxal lines short, not long and connecting medioapically on the prosternum; abdominal punctuation weak, not moderate; abdominal pubescence extremely faint, not moderate; body length to width ratio 1.9 to 1, not 2 to 1.

Male genitalia: The median lobe (see Boyle, 1956, fig. 135) is narrowly membranous along the broad opening of the median orifice. The aedeagus is quite similar to that of *Mycotretus nigromanicatus* Boyle in gross characteristics. The distinctive anterior end of the internal sac is illustrated in Boyle (1956, fig. 136).

Published illustrations: The adult is figured in color by Gorham (1887–1899, pl. 5: fig. 4).

Type: Not seen.

Type-locality: "Ciudad Durango, 8100 feet, Mexico."

Distribution: This species has been collected in the southwestern United States and in Mexico. The following localities have been

reported: MEXICO: Durango: "Ciudad in Durango, 8100 feet." UNITED STATES: Arizona: Cochise Co.: Chiricahua Mountains, July 20, 1950, July 1936, and June 24; Pine Creek, Chiricahua Mountains, June 24, 1897; Rustler Park, 8000–9000 feet, Chiricahua Mountains, July 20, 1950. Maricopa Co.: Phoenix.

### *Haematochiton maderi* (Delkeskamp), new combination

FIGURES 9, 10

*Triplax maderi* Delkeskamp, 1957, p. 114.

Diagnostic description: Coloration of head and elytra black. Overall shape elongate-elliptical; two ends of body about equally parabolically rounded; length 2.1 times the width. Eyes small, finely faceted, but coarser than in *Triplax*. Ocular striae terminating at antennal insertions, the epistoma immarginate. Antennae extending to procoxae, club 4-segmented, about twice as long as wide, densely

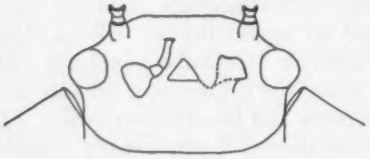

FIGURE 9.—*Haematochiton maderi* (Delkeskamp), new combination: underside of head.

clothed with setae of moderate coarseness; segment 3 of stem about equal in length to segments 4 and 5 together. Maxillary palpi terminal segment width to length ratio about 1:1 (fig. 9), semicircular, without brush. Mentum moderately large. Terminal labial palpi segments more cylindrical than in *Triplax*. Postmandibular lobes of moderate development (fig. 9). Pronotum subtrapezoidal, apical width about one-fifth less than the basal width, sides subparallel for about one-half distance nearest base. Pronotum yellow with six black spots, two of these are in one-fifth of the pronotum behind apex, the others are evenly transversely spaced medially. Pronotum margined basally, and laterally, immarginate apically between the eyes. Pronotal angle pores moderately small and relatively shallow. Elytra margined basally. Scutellum subcordate. Body below similar to *Triplax* with the following exceptions: the prosternal lines along the coxal inner edges are strong, straight, and subparallel; metasternal coxal lines absent; abdominal coxal lines short. Coloration: elytra and head black; pronotum yellow with six black spots, two of these at one-fifth of the protonum behind apex, the other four evenly transversely spaced medially; the following ferrugineous: antennae, underside of head (medially), legs, mesothorax, metathorax, and abdomen

(except posteriorly); the following testaceous: prothorax, palpi, tarsi, and, indeterminately, the abdominal posterior one-third.

Discussion: *H. maderi* can not be considered as *Triplax* because of the species' following critical characters: terminal segments maxillary palpi weakly widened without distinct apical brush; pronotal angle pores small, shallow.

Male genitalia: The anterior end of the internal sac is distinctive (fig. 10), showing a similarity to the anterior end of the internal sac of *H. carbonarius* Gorham as drawn by Boyle (1956, p. 138).

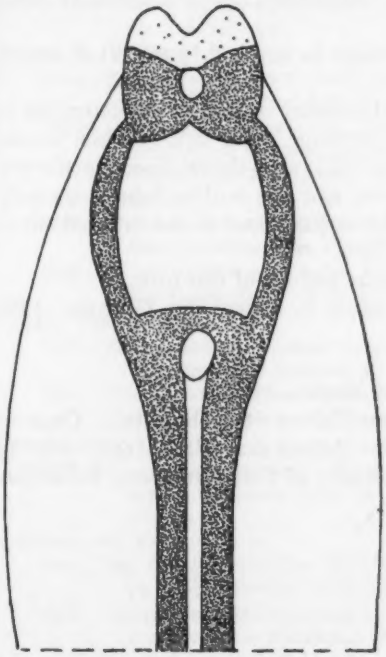

FIGURE 10. — *Haematochiton maderi* (Delkeskamp), new combination: anterior end of internal sac, anterodorsal view.

Biology: Nothing is known of the biology of this form.

Type-locality: Brazil?

Distribution: In this study specimens have been taken from the following locality: BRAZIL: Nova Teutonia, 27°11′8″, 52°23′1″.

***Haematochiton carbonarius* (Gorham)**

*Scaeother carbonarius* Gorham, 1888, p. 82, pl. 5 (fig. 5).
*Scaeother opacus* Schaeffer, 1915, p. 236.

Diagnostic description: Coloration carbonaceous black; palpi, tarsi, and five basal antennal segments somewhat lighter. Overall shape

somewhat more obtusely rounded anteriorly than posteriorly, length to width ratio about 2.1 to 1. Body covered with fine minutely reticulate microsculpture that destroys the nitidosity. Pronotum subquadrate, widest before base, sides evenly, even though feebly, arcuately convergent anteriorly. The pronotal apex feebly convex between the apical angles when the four pronotal angles are in equal focus. Pronotal and cephalic punctures moderately strong and deep, rather uniform in size and density, mostly separated by about the distance of their diameters. Elytral intervals distinctly punctulate, scutellum similarly punctulate. Metasternal and abdominal coxal lines present but fine and weak.

Variation: The observed size range in mm is 2.19 to 2.21 in width, and 4.49 to 4.65 in length.

Male genitalia: The aedeagus is similar to that of *H. elateroides* in general characteristics but the tegminal arms bear distinct dorsal lobes medially (see Boyle 1956, fig. 137); also, the enclosed ejaculatory duct is of a much larger diameter, and the median lobe is scarcely membranous dorso-apically. The anterior end of the internal sac is distinctive (see Boyle, 1956, fig. 138).

Biology: Nothing is known of the biology of this form.

Published illustrations: The adult is figured by Gorham, 1888 (1887–1899, pl. 5: fig. 5).

Type: Not seen.

Type-locality: Toluca, State of Mexico, Mexico.

Distribution: MEXICO: Mexico: Toluca (type-locality). Oaxaca: Oaxaca, July 15 to 21. Sonora: Bokachaka, Río Mayo, July 5. UNITED STATES: Arizona: type-locality of *Scaeother opacus* Schaeffer.

## Literature Cited


ALVARENGA, MOACIR

1965. Espécies tipos dos géneros e subgéneros neotropicais da família Erotylidae (Coleoptera). Bol. Univ. Fed. Paraná, Zool. II, no. 6, pp. 75–92.

BLACKWELDER, RICHARD E.

1944–57. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. U. S. Nat. Mus. Bull. 185, pts. 1–6, 1492 pp.

BOYLE, W. WAYNE

1954a. Five new species of *Triplax* from western North America (Coleoptera, Erotylidae). Proc. Ent. Soc. Washington, vol. 56, pp. 251–264.

1954b. Concerning the status of *Ischyrus graphicus* Lacordaire, with descriptions of four new erotylid species from western North America (Coleoptera: Erotylidae). Journ. New York Ent. Soc., vol. 62, pp. 39–53.

1956. A revision of the Erotylidae of America north of Mexico (Coleoptera). Bull. American Mus. Nat. Hist., vol. 110, art. 2, pp. 65–172.

1962. A new species of *Triplax* from Arizona (Coleoptera: Erotylidae). Pan-Pacific Ent., vol. 38, no. I, pp. 29–30.

CASEY, THOMAS LINCOLN

1916. Some random studies among the Clavicornia: Erotylidae. *In* Memoirs on the Coleoptera. Lancaster, Penn., vol. 7, pp. 146–172.

1924. Additions to the known Coleoptera of North America. *In* Memoirs on the Coleoptera. Lancaster, Penn., vol. 11, pp. 1–347.

CURTIS, JOHN

1824–40. British entomology; being illustrations and descriptions of the genera of insects found in Great Britain and Ireland. London, 16 vols.

DELKESKAMP, KURT

1951. Zur Zoogeographie der Erotyliden (Col.). Ent. Blätt., vols. 45–46, pt. 2, pp. 144–145. [Reference not seen.]

1957. Erotylidae. *In* Coleoptera II, vol. III *of* Beiträge zur Kenntnis der Insektenfauna Boliviens. Veröff. Zool. Staats.-Samml. München, vol. 5, pp. 93–116, 11 figs.

1965. The African species of Triplacini (with the first supplement for the African Tritomini) (Coleoptera, Erotylidae). Deutsche Ent., vol. 12, pp. 83–177.

FLEUTIAUX, EDMOND, et al.

1947. Coléoptères des Antilles, par Edmond Fleutiaux et al., Paris, Office de la Recherche Scientifique Coloniale, vol. 1. [Reference not seen.]

GORHAM, HENRY STEPHEN

1887–99. Erotylidae, Endomychidae and Coccinellidae. Vol. 7 *of* Coleoptera *in* Godman and Salvin, Biologia Centrali-Americana, 249 pp., 13 pls.

GRAVES, R. C.
1965. Observations on the ecology, behavior, and life cycle of the fungus-feeding beetle, *Cypherotylus californicus*, with a description of the pupa (Coleoptera: Erotylidae). Coleopt. Bull., vol. 19, no. 4, pp. 117–122.

GUÉRIN, JACINTHO
1946. *Paratritoma brasiliensis* new sp. from Brazil. Rev. Ent. Rio de Janiero, vol. 17. [Reference not seen.]
1952. Essay Monographique des Erotyliens Chiliens 1952 (Coleoptera). Rev. Chilena Ent., vol. 2, pp. 179–183, 6 figs.

HERBST, J. FRIEDRICH WILHELM
1793. Natursystem aller bekannten in und aüslandischen Insekten, als eine Fortsetzung der von Buffonschen Naturgeschichte. Berlin, vol. 5.

KUHNT, P.
1910. Neue Erotylidae (Coleoptera). Deutsche Ent., no. 3, pp. 219–270, 26 figs.

LACORDAIRE, JEAN THEODORE
1842. Monographie des erotyliens, famille de l'orde des coléoptères. Paris, 543 pp.

LECONTE, JOHN LAWRENCE
1854. Synopsis of the Erotylidae of the United States. Proc. Acad. Nat. Sci. Philadelphia, vol. 7, pp. 158–163.

MADER, LEOPOLD
1947. Revision of the erotylids of Peru. Stettiner Entomol. Zeit., vol. 105, pp. 95–117.
1951. Revision of the erotylids of Peru (continued). Ent. Arb. Munich, vol. 2, pp. 197–225. [Reference not seen.]

MAYR, ERNST; LINSLEY, E. GORTON; and USINGER, ROBERT L.
1953. Methods and principles of systematic zoology. New York, 336 pp., 45 figs.

PHILIPP, HANS
1965. Coléoptères Erotylidae. *In* Insectes, vol. 19 *of* Faune de Madagascar. [In French.]

PHILIPPI FEDERICO
1864. Stettiner Entomol. Zeit., vol. 25, p. 401.

SCHAEFFER, CHARLES FREDERIC AUGUST
1905. Some additional new genera and species of Coleoptera found within the limits of the United States. Mus. Brooklyn Inst. Arts Sci., Sci. Bull., vol. 1, pp. 141–179.

SELANDER, RICHARD B., and VAURIE, PATRICIA
1962. A gazetteer to accompany the "insecta" volumes of the Biologia Centrali-Americana. American Mus. Nov., no. 2099, 70 pp.

SHARP, DAVID and MUIR, F.
1912. The comparative anatomy of the male genital tube in Coleoptera. Trans. Ent. Soc. London, 1912, pp. 477–642, 36 pls.

TORRE-BUENO, J. R. DE LA
1962. A glossary of entomology. New York, 336 pp., 9 pls., plus suppl.

VILLIERS, ANDRÉ
1943. Etude morphologique et biologique des *Languriitae*. Paris: Éditions du Muséum, 98 pp.
1946. Coléoptères cérambycides de l'Afrique du Nord. Paris: Office de la Recherche Scientifique Coloniale, 152 pp.

VILLIERS, ANDRÉ.—Continued
1949. Mission P. L. Dekeyser et A. Villiers en Guinée et Côte d'Ivoire (1946) Dakar, vol. 1.
VILLIERS, ANDRÉ, and DEKEYSER, PIERRE
1956. Notations écologiques et biogéographiques sur la faune de l'Adrar; contribution a l'etude du peuplement de la mauritanie par P. L. Dekeyser et A. Villiers. Dakar: IFAN, 222 pp.
WILSON, JOHN W.
1930. The genitalia and wing venation of the Cucujidae and related families. Ann. Ent. Soc. America, vol. 23, pp. 305–358.

U.S. GOVERNMENT PRINTING OFFICE: 1967